REMARKS

Claims 1-13 are pending in the present application.

Claim Rejections – 35 U.S.C. §103(a)

The Examiner has rejected Claims 1-13 under 35 USC §103(a) as being unpatentable over Chow et al. (US 5,965,410 Oct. 12, 1999). The Examiner states from Page 2-3 that, "Chow et al. teach a method of identifying and detecting nucleic acids in a device with both pH and temperature gradients. They teach the crossectional variations in the channels upon which voltage gradients are translated create temperature and proton gradients. They teach the denaturation and renaturation of DNA with detection on intercalating dye." The Examiner concedes on Page 3 that Chow does not, "explicitly teach detecting rate of binding."

The Applicants respectfully contend that Chow et al does not render the present invention of Claims 1-13 obvious, and traverse this rejection as follows.

First, with respect to independent Claims 1, 5, 6, and 7, Chow generally does not disclose the concept of 1) the use of condition gradients (such as temperature, pH or light gradients) for detecting the rate of binding or rate of reaction between the biomolecules and the at least one reactant at discrete locations along a gradient axis.

Second, Chow does not disclose or suggest applying a voltage gradient to create a temperature or proton gradient wherein the gradient affects at least one of the rate of binding or reaction between the biomolecules and at least one reactant. Rather the passages cited by the Examiner (col. 15, lines 10-30 and col. 8, lines 46-55) refer to the use of a temperature or proton gradient for the purpose of inducing electrokinetic movement of a fluid within the disclosed microfluidic device.

Third, the Examiner refers to Example 1 in which, "An intercalating dye was added to the fluid to provide a fluorescent signal, depending upon whether the nucleic acid was double stranded or denatured." (Col. 32, lines 56-58) While the example disclosed in Chow et al. permits the discrimination of single vs. double stranded DNA, the assay does not disclose detecting the rate of binding or rate of reaction between the single and double stranded DNA and the intercalating dye at discrete locations along a gradient axis.

Chow et al. also do not disclose additional methods claimed in dependent claims. For example, Chow et al. do not disclose the application of a second condition gradient

which affects the rate of binding or reaction (Claim 2), or that such a second gradient is perpendicular to the first (Claim 3). Chow et al. also do not disclose the use of pH, temperature or light absorption gradients for the purpose of the present invention (Claims 4, 9, 10). Chow et al. do not disclose quantifying the amount of biomolecules from the from the binding rate or reaction, (Claim 8) or the use of the present method to detect proteins or prions, for example (Claim 13).

For at least these reasons, Claims 1-13 in the present application are distinguishable over Chow et al.

Applicant also points out that the differences between Chow et al. and the present invention in Claims 1-13 considered as a whole were not obvious since the prior art does not suggest the desirability of making the claimed combination. First, the Examiner does not establish that all claim limitations are taught or suggested in the prior art. The Examiner relies on the statement on Page 3 of the Office Action, that, "One of ordinary skill in the art would have been motivated to measure binding in Chow et al's device in order to monitor the product in real time. It was well known and commonly practiced in the art to monitor the reaction product with intercalating dyes. It would have been prima facie obvious to monitor the binding of DNA in Chow et al's pH and temperature gradient device in order to detect reaction kinetics." However, the assay taught in Chow appears to be for the purpose of determining only the presence or absence of single or double stranded DNA with dye. The Examiner does not claim that those in the art would have been motivated to use Chow et al to 1) create a condition gradient to affect the rate of binding or reaction between biomolecules and a reactant (such as by altering the biomolecules inherent charge and/or inherent energy), and detect the rate of binding or reaction between the biomolecules and the reactant. Simply observing the labeling of DNA in real time does not render the present invention obvious.

Second, Chow et al can not be combined as the Examiner suggests to teach the present invention, as Chow et al teaches away from the present invention by teaching the electrophoretic transport of fluid through microchannels by using temperature gradients. In the present invention, the method is preferably conducted under a fully equilibrated distribution of reactants, such as achieved by simple capillary flow and diffusion. The fluid transport taught by Chow et al. would confound the ability to perform the methods claimed

as the creation of condition gradients and measurements of local binding kinetics would be disturbed by such induced flow though a reaction chamber.

Third, the Examiner does not make specific contentions that the prior art discloses the methods claims by dependent Claims 2-4 and 8-13.

Finally, to the extent the Examiner chooses to maintain this rejection, the Applicant requests that the Examiner cite to specific prior art containing the motivation or suggestion to modify Chow et al. to teach the invention of Claims 1-13.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 501946 and please credit any excess fees to such deposit account.

Respectfully submitted,
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